CLAIMS

1. Device for monitoring a household electric user (COT,LB,AU), in particular a household appliance, presenting an electric load, where said monitoring device (AI) is connected between a source of electric energy (PDC) and said electric load, said monitoring device (AI) comprising measuring means (A) for detecting the quantity of

5   electric power or current absorbed by said user (COT,AL,AU),

    characterized in that said monitoring device (AI) comprises control means (SC), which are programmed for:

- comparing the absorption of electric power or current measured through said measuring means (A) with reference values of electric power or current, which are stored within

10   said control means;

- generating, in function of said comparison, information which being representative of the present status or phase of operation of said electric user (COT,LB,AU);

- allowing said information to be read from outside said device (AI).

2. Device, according to claim 1, characterized in that said control means (SC) are

15   further programmed for generating, in function of said comparison, information being representative of the efficiency or performance status of said electric user (COT,AL,AU).

3. Device, according to claim 1, characterized in that said control means (SC) are further programmed for generating, in function of said comparison, at least information being useful for estimating the wear status of said electric user (COT,AL,AU).

20   4. Device, according to claim 1, characterized in that said control means (SC) comprise memory means (MNV) containing reference data or profiles, being representative of a theoretical level of absorption of electric power or current that the electric user (COT,LB,AU) would determine under normal and correct operating conditions.

5. Device, according to claim 4, characterized in that said control means (SC)

25   comprise processing means (MC) for comparing the result of the measurements performed by said measuring means (A) with said reference data or profiles.

. 6. Device, according to at least one of the previous claims, characterized in that said

processing means (MC) are programmed for generating, on the basis of said comparison, said information.

7. Device, according to at least one of the previous claims, characterized in that said control means (SC) are programmed for realizing the storage of at least a part of said
5 information within non-volatile read/write memory means (MNV).

8. Device, according to at least one of the previous claims, characterized in that said information are:

- of a first type, indicating the function currently performed by said electric user (COT,LB,AU), said information of the first type being in particular generated by said
10 control means (SC) in function of said comparison, and/or

- of a second type, indicating the quality of operation of said electric user (COT,LB,AU) and/or the efficiency status of its internal components, said information of the second type resulting in particular from the detection, by said control means (SC), of deviations which are considered significant between the result of the measurements
15 performed by said measuring means (A) and said reference data or profiles, and/or

- of a third type, concerning the wear status of internal components of said electric user (COT,LB,AU) and/or its modes of previous use.

9. Device, according to claim 1, characterized in that said control means (SC) comprise interface means (N,LSA) for connecting said device (AI) to a communication bus
20 (RE), in particular of the power line carrier type, said control means (SC) being programmed for making at least part of said information available to said bus (RE) and/or for receiving instructions through said bus (RE).

10. Device, according to claim 1, characterized in that said control means (SC) comprise interface means (N,LSA) for connecting said device (AI) to an electronic external
25 apparatus (PC), in particular a personal computer, which is apt for reading at least part of said information and/or for programming said control means (SC).

11. Device, according to claim 1, characterized in that switching means (RNC) are provided, comprising in particular a normally closed relay, controlled by said control

means (SC) for determining the interruption of the electric supply to said electric user (COT,LB,AU).

12. Device, according to claims 7 and 9, characterized in that said control means (SC) are programmed for realizing the switching of said switching means (RNC) following instructions received through said bus (RE).

13. Device, according to claim 1, characterized in that said control means (SC) comprise configuration means (STE) for selecting, among a plurality of possible selections, the type of electric user (COT,LB,AU) said monitoring device (AI) has to be associated to.

14. Device, according to at least one of the previous claims, characterized in that within said memory means (MNV) a plurality of said reference data or profiles are contained, each one of them relating to a given household electric user, the reference data or profile relating to the electric user which is associated to the device being selected through said configuration means (STE).

15. Device, according to claim 11, characterized in that manual control means (KEY) are provided, for realizing a switching of said switching means (RNC).

16. Device, according to at least one of the previous claims, characterized in that said control means (SC) comprise a current differential sensor (SD), for detecting likely current leak to ground.

17. Device, according to at least one of the previous claims, characterized in that said control means (SC) comprise temperature sensing means (NTC), in particular for room temperature detection.

18. Device, according to at least one of the previous claims, characterized in that said interface means (N,LSA) comprise an asynchronous serial line (LSA).

19. Device, according to at least one of the previous claims, characterized in that acoustic (BZ) and/or optical signalling means (LED) are provided, controlled by said control means, for signalling anomalous conditions of operation of said electric user (COT,LB,AU) and/or the switching status of said switching means (RNC).

20. Device, according to at least one of the previous claims, characterized in that

said control means (SC) comprise connecting means to external sensors (SG), such as a gas sensor, a flood sensor, a smoke sensor, etc.

21. Method for monitoring the status of operation and/or efficiency and/or wear of a household electric user (COT,LB,AU), in particular a household appliance, characterized in

5   that the following steps are provided:

- measuring the absorption of electric power or current by the electric user (COT,LB,AU);

- comparing the measured electric power or current absorption with a reference electric power or current absorption;

10 - obtaining, on the basis of said comparison, information being indicative of the present status or operation phase and/or the efficiency status and/or the wear status of the electric user (COT,LB,AU);

- likely storage of at least a part of the information obtained.

22. Method, according to claim 21, characterized in that the absorption is measured

15 instant by instant, in particular for determining an absorption profile which expresses the evolution in time of the real level of absorption of electric power or current by the electric user (COT,LB,AU).

23. Method, according to claim 21, characterized in that the reference absorption consists of a reference absorption profile, which is representative of the evolution in time

20 of a theoretical level of absorption of electric power or current that said electric user (COT,LB,AU) would produce under its normal and correct operating conditions.

24. Method, according to claim 21 or 23, characterized in that the selection is provided of said reference absorption or profile among a plurality of reference absorptions or profile which can be selected in function of the electric user being monitored.

25   25. Method, according to at least to one of the previous claims, characterized in that said reference absorptions or profiles are obtained through experimental analysis.

26. Method, according to claim 21, characterized in that said information are of the functional type, i.e. concerning the present mode of operation of the electric user

(COT,LB,AU), said information of the functional type being generated in particular in function of said comparison.

27. Method, according to claim 21, characterized in that said information are of the diagnostic type, i.e. concerning the quality of operation of the electric user and/or the efficiency status of its internal components, said information of the diagnostic type resulting in particular from the detection of deviations being considered significant between the measured absorption and the reference absorption.

28. Method, according to claim 21, characterized in that said information are of the statistical type, i.e. concerning the wear status of internal components of the electric user and/or its modes of previous use.

29. Method, according to claim 27 and/or 28, characterized in that the storage of said information of the diagnostic type and/or said information of statistical type is provided.

30. Method, according to at least one of the previous claims, characterized in that said information of the statistical type are determined in function of the storage and the relevant update in time of said information of the functional type.

31. Method, according to at least one of the previous claims, characterized in that at least a part of said information is made available on a communication network (RE), to which a plurality of household electric users are connected.

32. Method, according to at least one of the previous claims, characterized in that at least a part of said information is used for estimating the functional and/or wear status of internal components of the electric user (COT,LB,AU), in order to make the repair and/or maintenance work easier.

33. Method, according to at least one of the previous claims, characterized in that at least a part of said information is used for rationalizing the electric power absorption in the household environment wherein the electric user (COT,LB,AU) is installed.

34. Method, according to claims 33, characterized in that at least a part of said information is used for controlling, from a remote location, the operating status of the

electric user (COT,LB,AU), in particular for realizing its activation and/or deactivation.

35. Method, according to claim 27, characterized in that, in presence of said information of the diagnostic type, the activation of acoustic (BZ) and/or optical (LED) signalling means is provided.

5   36. Monitoring system of a plurality of household electric users (FO,LS,FG,LB,COT,AU), in particular household appliances, pertaining to one same household environment and connected in a network (RE), characterized in that at least an electric user of a first type (LB,COT,AU) is provided, which is connected to said network (RE) by means of a monitoring device (AI) realized according to at least one of claims 1 to

10   20, said monitoring device (AI) being programmed for sending and receiving data through said network (RE).

37. System, according to claim 36, characterized in that at least an electric user of a second type is provided (FO,LS,FG), which comprises means (N) for interfacing with said network (RE), and equipped with an electronic control system being programmed for

15   sending and receiving data through said network (RE).

38. System, according to claim 37, characterized in that the electronic control system of said electric user of the second type (FO,LS,FG) is programmed for self-limiting its own power absorption on the basis of the difference between the value of the maximum usable power (Pmax) and the value of the total absorbed power (PT), in particular with the

20   aim of constantly avoiding, in an automatic way, any blackouts consequent to power over-absorptions of accidental type.

39. System, according to at least one of the previous claims, characterized in that a source of information (MP) concerning the total absorption of electric power (PT) of the entire household environment and the value of the maximum usable electric power (Pmax)

25   is connected to said network (RE).

40. System, according to claim 39, characterized in that the information concerning the total absorption of electric power (PT) of the entire household environment and the value of the maximum usable electric power (Pmax) are transmitted by said information

source (MP) onto said network (RE) with variable frequency.

41. System, according to at least to one of the previous claims, characterized in that said network consists of the same electric network (RE) of the household environment and that the communication system among the various electric users (FO,LS,FG,LB,COT,AU) connected to said network is of the power line carrier type.

42. System, according to at least to one of the previous claims, characterized in that said control means (SC) of said monitoring device (AI) are apt to control the switching of said switching means (RNC) in function of data being available on said network (RE), in order to avoid the exceeding of the value of the maximum usable electric power (Pmax).

43. System according to at least to one of the previous claims, characterized in that at least a communication device (NT,MC) is associated to said network (RE), for transmitting outside of said household environment data being available on said network (RE), and/or for receiving, from outside said household environment, instructions for said monitoring device (AI) and/or said electric users of the second type (FO,LS,FG).

44. System, according to the previous claim, characterized in that said communication device comprises a telephone node (NT,MC), in particular of the cellular type (MC) capable of managing both the transmission and the reception of digital data.

45. System, according to claim 43, characterized in that it provides said monitoring device (AI) is provided for allowing, through said communication device (RE) and said network (RE), the control from a remote location of the operating status of said electric user of the first type (LB,COT,AU), and/or its activation and/or its deactivation.

46. Device for monitoring a household electric user (COT,LB,AU) presenting an electric load, in particular a household appliance, where said monitoring device (AI) is connected between a source of electric energy (PDC) and said electric load, said monitoring device (AI) comprising measuring means (A) for detecting the quantity of electric power or current absorbed by said electric user (COT,AL,AU), characterized in that said monitoring device (AI) comprises control means (SC) programmed for:

- generating, in function of the result of the measures performed by said measuring

means (A), information being representative of the present operation status and/or the efficiency status and/or the wear status of said electric user (COT,AL,AU),

- allowing said information to be read from outside said device (AI).